

EXERCISES

For more practice, see *Extra Practice*.

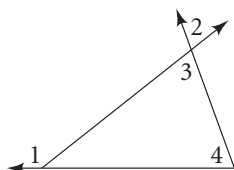
Practice and Problem Solving

A Practice by Example

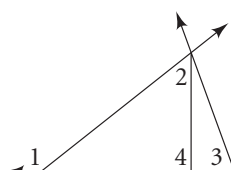
Example 1 (page 274)

Explain why $m\angle 1 > m\angle 2$.

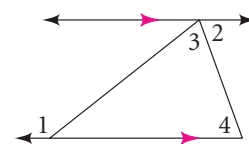
1.



2.



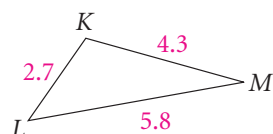
3.



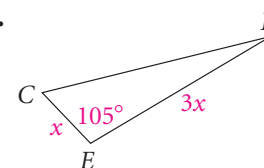
Example 2 (page 274)

List the angles of each triangle in order from smallest to largest.

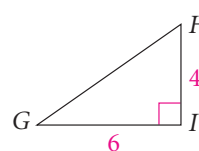
4.



5.



6.



7. $\triangle ABC$, where $AB = 8$, $BC = 5$, and $CA = 7$

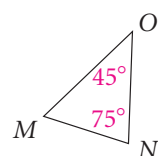
8. $\triangle DEF$, where $DE = 15$, $EF = 18$, and $DF = 5$

9. $\triangle XYZ$, where $XY = 12$, $YZ = 24$, and $ZX = 30$

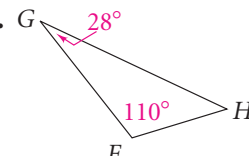
Example 3 (page 275)

List the sides of each triangle in order from shortest to longest.

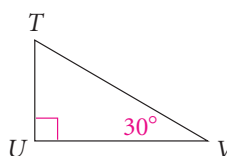
10.



11.



12.



13. $\triangle ABC$, with $m\angle A = 90$, $m\angle B = 40$, and $m\angle C = 50$

14. $\triangle DEF$, with $m\angle D = 20$, $m\angle E = 120$, and $m\angle F = 40$

15. $\triangle XYZ$, with $m\angle X = 51$, $m\angle Y = 59$, and $m\angle Z = 70$

Example 4 (page 276)

Can a triangle have sides with the given lengths? Explain.

16. 2 in., 3 in., 6 in.

17. 11 cm, 12 cm, 15 cm

18. 8 m, 10 m, 19 m

19. 1 cm, 15 cm, 15 cm

20. 2 yd, 9 yd, 10 yd

21. 4 m, 5 m, 9 m

Example 5 (page 276)

The lengths of two sides of a triangle are given. Describe the lengths possible for the third side.

22. 8 ft, 12 ft

23. 5 in., 16 in.

24. 6 cm, 6 cm

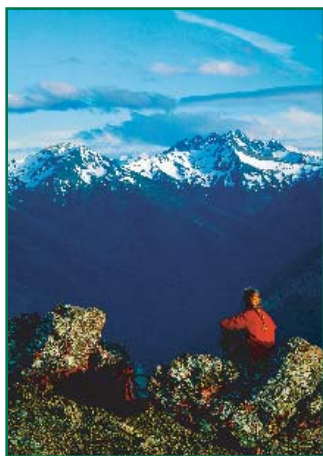
25. 18 m, 23 m

26. 4 yd, 7 yd

27. 20 km, 35 km

B Apply Your Skills

28. **Error Analysis** The Shau family is crossing Kansas on Highway 70. A sign reads "Wichita 90 miles, Topeka 110 miles." Avi says, "I didn't know that it was only 20 miles from Wichita to Topeka." Explain to Avi why the distance between the two cities doesn't have to be 20 miles.



Exercise 29



29. **Writing** Explain why the distance between the two peaks in the photograph is greater than the difference of the distances from the hiker to each of the peaks.

30. **The Hinge Theorem** The hypothesis of the Hinge Theorem is stated below. The conclusion is missing.

Suppose two sides of one triangle are congruent to two sides of another triangle. If the included angle of the first triangle is larger than the included angle of the second triangle, then ?.

- Draw a diagram to illustrate the hypothesis.
- The conclusion of the Hinge Theorem concerns the sides opposite the two angles mentioned in the hypothesis. Write the conclusion.
- Draw a diagram to illustrate the converse.
- Converse of the Hinge Theorem** Write the conclusion to this theorem.

Suppose two sides of one triangle are congruent to two sides of another triangle. If the third side of the first triangle is greater than the third side of the second triangle, then ?.



Exercise 31



32. **Algebra** Find the longest side of $\triangle ABC$, if $m\angle A = 70$, $m\angle B = 2x - 10$, and $m\angle C = 3x + 20$.

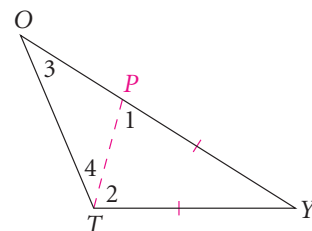


33. **Developing Proof** Fill in the blanks to complete a proof of Theorem 5-10: If two sides of a triangle are not congruent, then the larger angle lies opposite the longer side.

Given: $\triangle TOY$, with $YO > YT$.

Prove: a. ? $>$ b. ?

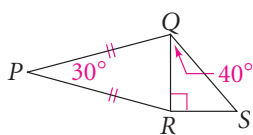
Mark P on \overline{YO} so that $\overline{YP} \cong \overline{YT}$. Draw \overline{TP} .



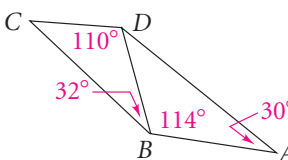
Statements	Reasons
1. $\overline{YP} \cong \overline{YT}$	1. Ruler Post.
2. $m\angle 1 = m\angle 2$	c. <u>?</u>
3. $m\angle OTY = m\angle 4 + m\angle 2$	d. <u>?</u>
4. $m\angle OTY > m\angle 2$	e. <u>?</u>
5. $m\angle OTY > m\angle 1$	f. <u>?</u>
6. $m\angle 1 > m\angle 3$	g. <u>?</u>
7. $m\angle OTY > m\angle 3$	h. <u>?</u>

Critical Thinking Determine which segment is shortest in each diagram.

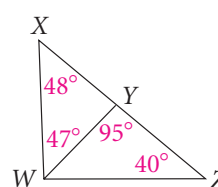
34.



35.



36.



37. **Probability** A student has two straws, one 6 cm long and the other 9 cm long. She picks a third straw at random from a group of four straws whose lengths are 3 cm, 5 cm, 11 cm, and 15 cm. What is the probability that the straw she picks will allow her to form a triangle?

Need Help?
Exercise 33 plan: Get $m\angle 4 + m\angle 2 > m\angle 2$, $m\angle 2 = m\angle 1$, and $m\angle 1 > m\angle 3$.

For Exercises 38 and 39, x and y are whole numbers, $1 < x < 5$, and $2 < y < 9$.

38. The sides of a triangle are 5 cm, x cm, and y cm. List possible (x, y) pairs.

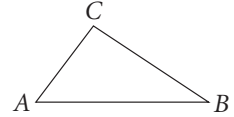
39. **Probability** What is the probability that you can draw an isosceles triangle that has sides 5 cm, x cm, and y cm, with x and y chosen at random?

Proof 40. Prove Theorem 5-12: The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

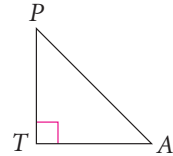
Given: $\triangle ABC$

Prove: $AC + CB > AB$

(Hint: On \overline{BC} mark a point D not on \overline{BC} , so that $DC = AC$. Draw \overline{DA} and use Theorem 5-11 with $\triangle ABD$.)



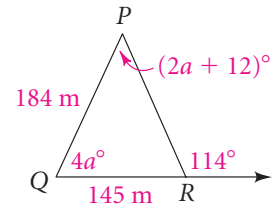
41. **Reasoning** A corollary to Theorem 5-11 states: The perpendicular segment from a point to a line is the shortest segment from the point to the line. Given that $\overline{PT} \perp \overline{TA}$, show that $PA > PT$.



Standardized Test Prep

Multiple Choice

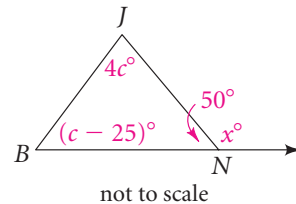
42. Which is the best estimate for PR ?
- A. 137 m B. 145 m
C. 163 m D. 187 m



Quantitative Comparison

Compare the boxed quantity in Column A with the boxed quantity in Column B. Choose the best answer.

- A. The quantity in Column A is greater.
B. The quantity in Column B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.



Column A

Column B

43.

x

c

44.

JN

BN

45.

$x - 4c$

$c - 25$

46.

JB

BN

Short Response



Take It to the NET

Online lesson quiz at
www.PHSchool.com

Web Code: afa-0505

47. In $\triangle ABC$, $m\angle A > m\angle C > m\angle B$.

- a. Of \overline{AB} and \overline{AC} , one measures 5 inches and the other measures 9 inches. Which measures 9 inches? Explain.
b. Based on your conclusion for part (a), find all possible whole-number measures for the third side. Explain.



Mixed Review

Lesson 5-4

Write the negation of each statement.

48. $m\angle A \leq m\angle B$

49. $m\angle X > m\angle B$

50. The angle is a right angle.

51. The triangle is not obtuse.

Lesson 2-5

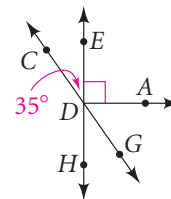
Use the diagram. Find the measure of each angle.

52. $\angle ADH$

53. $\angle GDH$

54. $\angle CDH$

55. $\angle ADG$



Lesson 1-7

Find to the nearest tenth of a square unit the area of each circle with the given radius r or diameter d .

56. $r = 1.6$ ft

57. $d = 35$ mm

58. $r = 0.5$ m

59. $d = 20$ mi